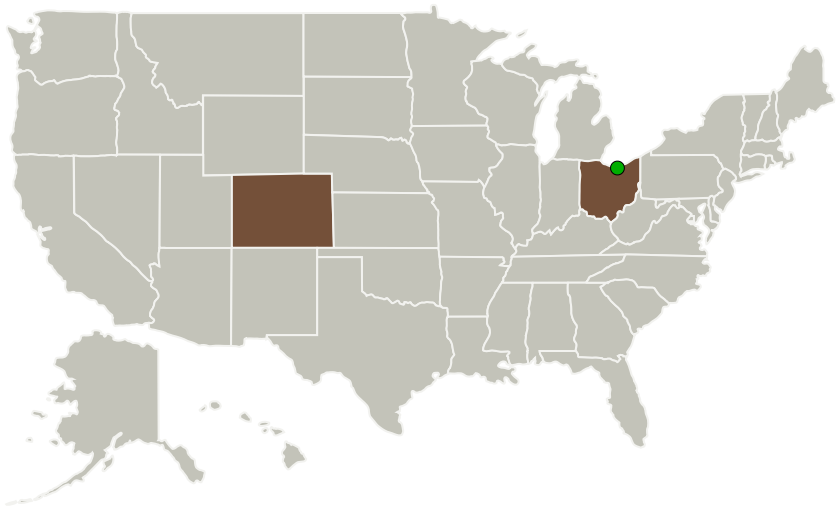
Cubesat SEP Power Module, Phase II

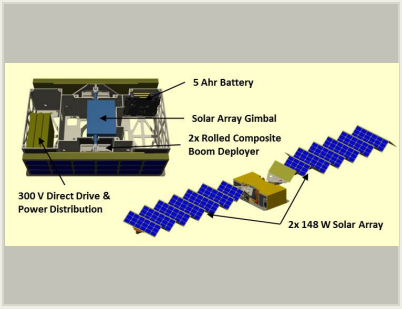
Completed Technology Project (2016 - 2017)

Project Introduction

As electronics continue to shrink, the capabilities of CubeSats continue to expand. This offers the possibility of entirely new mission classes for space exploration. However, CubeSats small surface area limits their power availability. Typical CubeSat arrays are <100 W. The low power limits their capability, particularly as increased distance from the sun reduces power further. The low power limits instrument selection, telecommunications options, and electric propulsion usage. To resolve these issues, ExoTerra has developed a CubeSat Solar Electric Propulsion Power Module. The module incorporates a lightweight deployable solar array with up to 296 W (BOL) of power. The module efficiently delivers the power to a micro Hall Effect Thruster at nearly 300 V via a direct drive power distribution card. The specific power of over 140 W/kg and power density of over .17 W/cm3 efficiently packages the module into a 6U CubeSat. When not needed for electric propulsion, the card steps the voltage down to either 28 or 12 V to deliver high power for either instrument or telecommunications use. ExoTerra builds on the Phase I prototype and functional testing effort by building a qualification unit of the array and direct drive electronics in Phase II. During the period of performance, we initiate functional and environmental testing to push towards commercializing the technology.

Primary U.S. Work Locations and Key Partners





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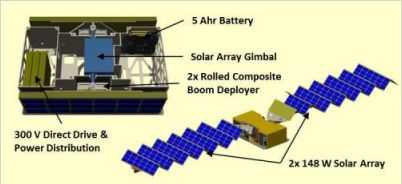
Organizations Performing Work	Role	Type	Location
ExoTerra Resource, LLC	Lead Organization	Industry	Littleton, Colorado
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Colorado	Ohio

Images



Briefing Chart Image
Cubesat SEP Power Module, Phase II
(https://techport.nasa.gov/image/127202)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
ExoTerra Resource, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Michael Vanwoerkom

Co-Investigator:
Michael Vanwoerkom

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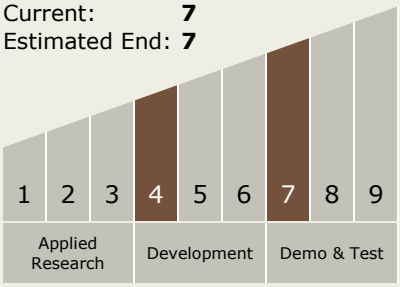
Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.3 Power Management and Distribution
    - TX03.3.3 Electrical Power Conversion and Regulation

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System